



CYLINDROCLADIUM ROT OF SPATHIPHYLLUM

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Introduction

Several spathiphyllum species and their cultivars are now widely grown in Hawaii and are an important part of the array of indoor foliage plants produced in the state. Given sufficient light, these plants, especially the new 'Tasson' types, produce long-lasting white flowers. The combined qualities of attractive, deep green foliage and low maintenance required by these plants have popularized many cultivars among growers, landscapers, gardeners, and homeowners.

A few cultivars of spathiphyllum have been grown in Hawaii for many years without serious diseases. In the 1980s, however, the importation of new cultivars also introduced new diseases to the state. Among the most serious has been the fungal pathogen *Cylindrocladium spathiphylli*, first discovered on Oahu in 1985.

This fungus was first observed and described in Florida in 1980, but its route of entry into Hawaii remains speculative. As in Hawaii, Florida growers produced spathiphyllum free of *Cylindrocladium* for many years before 1980.

Disease and Symptoms

The disease begins as small, elongate, black to brown lesions on roots or petioles. On roots, these small lesions enlarge into black lesions about 3/16" to 9/16" (5 mm to 15 mm) in length. Smaller feeder roots rot easily, and the fungus spreads into the larger roots. Disease development proceeds fairly rapidly under moist, warm conditions, and the entire root system may be destroyed in a few weeks or months, depending on plant size and level of initial contamination. Contamination of large, mature plants with a low number of fungal spores will result in slow disease development, and several months may pass before the plants have obvious foliar symptoms.

Thus, although roots are infected, these large plants may not show above-ground symptoms for extended periods. When enough roots or petioles are damaged, water uptake is reduced and infected plants show water stress symp-

toms, such as dull green leaves, wilting, and premature yellowing of older leaves. Plants become weak, exhibit low vigor, and grow poorly (Figs. 1, 2, 3).

Rapid damping-off of young seedlings and tissue-cultured plantlets also occurs. The symptoms are similar to those of larger plants. Beginning with the formation of dark root lesions, the pathogen consumes the entire root system, and plant death occurs within a month or less after initial infection.

The fungus also invades the corm of the plant, and many plants are eventually killed or are of such poor quality that they are not marketable.

Causal Organism and Disease Spread

Pure cultures of the causal organism, identified as *Cylindrocladium spathiphylli*, were obtained from diseased spathiphyllum, establishing the organism's presence in Hawaii for the first time. Pathogenicity tests of *C. spathiphylli* were conducted in Hawaii, and this fungus was confirmed as the pathogen in controlled experiments (Fig. 4). Conidia, or spores, of the fungus (Fig. 5) were produced in pure agar culture, and a suspension of these spores was applied to healthy plants' roots. Disease symptoms were reproduced within a month on young plants.

Cylindrocladium spathiphylli produces large numbers of conidia on branched conidiophores. Masses of these spores are frequently visible on roots, especially after infected roots are washed and kept moist for 24 hours. These conidia are readily spread by splashing or moving water, by the use of contaminated tools, pots, media, clothing, or hands, by the movement of infected plants, and probably by large slugs. The fungus also produces survival structures called sclerotia, which are compact masses of knotted fungal growth. These sclerotia enable the fungus to survive on diseased plants, or in infested organic matter long after the plant is dead and decomposed.



Figure 1. Wilted and necrotic leaves of *Cylindrocladium*-infected *spathiphyllum* plant from a commercial nursery.



Figure 2. Field-collected *spathiphyllum* plants with diseased (left) and healthy roots.

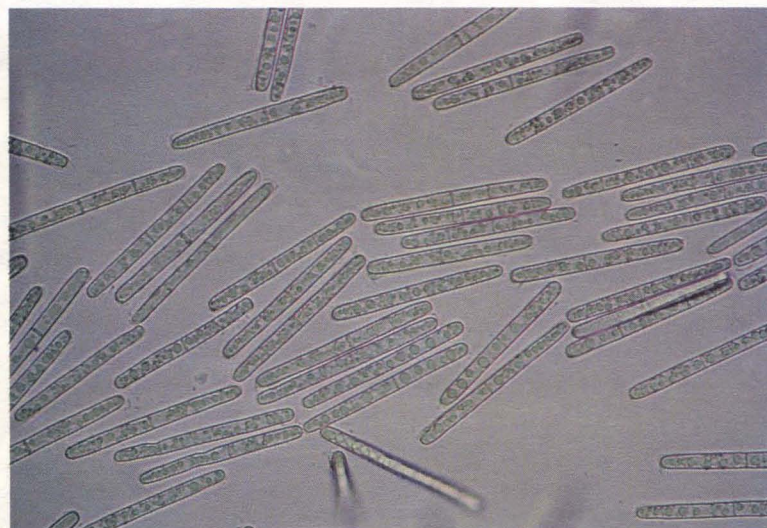
Figure 3. Spathiphyllum plants with elongate black lesions on petiole base and stem.



Figure 4. Comparison of healthy control plants and diseased plants. Diseased plants were artificially inoculated with conidia (spores) of *Cylindrocladium spathiphylli* one month before photograph was taken.



Figure 5. Photomicrograph of conidia of *Cylindrocladium spathiphylli*. Magnification = 340X.



Control

Spathiphyllum crops should be started from disease-free plants, and every effort should be made to maintain healthy plants, rather than relying on chemicals to treat the disease after it develops. Beginning with clean, tissue-cultured plants, greenhouse sanitation management can virtually eliminate this problem for potted-plant growers. This approach has worked successfully for many other serious diseases of crops such as dieffenbachia and philodendron. In contrast, any attempt to salvage contaminated plants by keeping them for sale or as stock plants will ensure continual disease problems.

Severely diseased plants should be destroyed immediately. These plants do not recover even with fungicidal treatments or replanting. They are a constant source of virulent spores that will contaminate clean plants. Any infected plant has the potential to spread the disease. A commitment must be made to identify diseased plants and isolate them or, preferably, destroy them. Plants with more than 30 percent of the root system infected rarely recover.

Pots, trays, tools, benches, and other supplies that come in contact with infected plants

should be washed, then treated with a surface disinfectant such as a freshly prepared 10 percent solution of liquid household bleach. Potting medium from infected plants should not be reused unless it is steam treated or fumigated to kill fungi.

Of several fungicides tested in Hawaii, benomyl (Benlate) was the best for preventing disease development and also for controlling the disease in plants that were infected for one week or less. Benomyl will not completely eradicate the fungus and should be used only as a supplementary treatment to other cultural practices mentioned above. Benomyl has been reported to be slightly less effective in Florida.

Cultivar Susceptibility

Spathiphyllum cultivars 'Tasson', 'Wallisii', 'Queen Amazonica', and 'Mini' are very susceptible to *C. spathiphylli*. 'Silver Streak' was resistant to one isolate of *C. spathiphylli* but weakly susceptible to another. Thus far, 'Silver Streak' is the only commercial cultivar showing resistance to this pathogen.

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